WHAT IS CLAIMED IS:

1. A method of obtaining an isolated, non-culture expanded mesenchymal stem cell, comprising the following steps:
Contacting a human cell population with an antibody that binds to a surface molecule expressed on a mesenchymal stem cell within said human cell population, so as to form a cell-antibody-complex;
Recovering said mesenchymal stem cell;
Maintaining said recovered mesenchymal stem cell under conditions preventing significant cellular expansion;
thereby obtaining a non-culture expanded mesenchymal stem cell.

2. The method of claim 1, wherein said human cell population comprises unfractionated bone marrow, unfractionated human blood, unfractionated human dermis, unfractionated human periosteum, unfractionated muscle or unfractionated human fat.

3. The method of claim 1, wherein the recovered mesenchymal stem cell is capable of further differentiating into a differentiated cell of mesenchymal tissue lineage.

4. The method of claim 3, wherein said mesenchymal tissue lineage is bone, cartilage, fat, tendon, ligament, muscle or marrow stroma.

5. The method of claim 3, wherein said mesenchymal tissue lineage is kidney tissue, liver tissue, spleen tissue or neuronal tissue.

6. The method of claim 1, wherein said antibody interacts with at least one human CD105 antigen.

7. The method of claim 1, wherein said antibody interacts with at least one human CD29 or CD44 antigen.

8. The method of claim 1, wherein said antibody is supported on a column, plastic, array or magnetic bead.

9. The method of claim 1, wherein said mesenchyal stem cell is further genetically engineered to express a protein of interest.

10. The method of claim 9, wherein said protein of interest is a macromolecule necessary for cell growth, morphogenesis, differentiation, or tissue building and combinations thereof.

11. The method of claim 9, wherein said macromolecule necessary for cell growth, morphogenesis, differentiation, and/or tissue building and combinations thereof is a bone morphogenic protein, a bone morphogenic-like protein, an epidermal growth factor, a fibroblast growth factor, a platelet derived growth factor, an insulin like growth factor, a transforming growth factor, a vascular endothelial growth factor, Ang-1, PIGF and combinations thereof.

12. Use of an isolated, non-culture expanded mesenchymal stem cell in the preparation of a medicament for administration to a subject, wherein the non-culture expanded mesenchymal stem cell is obtained via the method of claims 1-11.

13. Use of an isolated, non-culture expanded mesenchymal stem cell in the preparation of a medicament for stimulating or enhancing tissue repair in a subject, wherein the non-culture expanded mesenchymal stem cell is obtained via the method of claims 1-11.

14. Use of an isolated, non-culture expanded mesenchymal stem cell in the preparation of a medicament for stimulating or enhancing tissue formation in a subject, wherein the non-culture expanded mesenchymal stem cell is obtained via the method of claims 1-11.

15. Use of an isolated, non-culture expanded mesenchymal stem cell in the preparation of a medicament for maintaining or increasing bone volume, bone quality, or bone strength in a subject, wherein the non-culture expanded mesenchymal stem cell is obtained via the method of claims 1-11.

16. Isolated, non-culture expanded human adult mesenchymal stem cells.

17. The mesenchymal stem cells of claim 16, wherein said mesenchymal stem cells express CD105, CD29 and/or CD44 cell surface antigens.

18. The mesenchymal stem cells of claim 16, wherein at least 50 % of said mesenchymal stem cells expressing CD105, express CD29 and/or CD44 cell surface antigens.

19. The mesenchymal stem cells of claim 16, wherein less than 25 % of said mesenchymal stem cells expressing CD105, express CD45, CD14, CD34 and/or CD31 cell surface antigens.

20. The mesenchymal stem cells of claim 16, wherein said mesenchymal stem cells are capable of further differentiation to cells of mesenchymal tissue lineage.

21. The mesenchymal stem cells of claim 20, wherein said mesenchymal tissue lineage is bone, cartilage, fat, tendon, ligament, muscle or marrow stroma.

22. The mesenchymal stem cells of claim 16, wherein said mesenchymal stem cells are engineered to express at least one protein of interest.

23. The mesenchymal stem cells of claim 22, wherein said protein of interest is a macromolecule necessary for cell growth, morphogenesis, differentiation, tissue building or combinations thereof.

24. The mesenchymal stem cells of claim 23, wherein said macromolecule necessary for cell growth, morphogenesis, differentiation, and/or tissue building is a bone morphogenic protein, a bone morphogenic-like protein, an epidermal growth factor, a fibroblast growth factor, a platelet derived growth factor, an insulin like growth factor, a transforming growth factor, a vascular endothelial growth factor, Ang-1, PIGF or combinations thereof.